25. Monitoring gully headcut retreat rates in May Bati

(Based on Frankl et al., in prep.)

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Data on gully headcut retreat rates and changes therein is non-existent for North Ethiopia. Therefore, gully headcut retreat rates over a period of 1 to 45 years were studied (Frankl et al., in preparation). In the 3 km² large catchment of May Bati (13°39'N, 39°12'E), 24 gully headcuts were monitored during the rainy season (July – September) of 2010. In order to understand the retreat rates, data were collected on topography (catchment area, slope gradient), climate (daily rainfall) and the environment (lithology, soil) and land use. In addition, gully headcut retreat rates over a period up to 45 years were assessed by identifying the location of headcuts on aerial photographs and on historical terrestrial photographs, and by localizing the previous and current (2010) position of the headcuts in the field. The results serve as input for testing several empirical models that predict headcut retreat rates based on findings from elsewhere in the world. The 2010 field observations show that many headcuts do not retreat further because of improved land management and that especially Vertisol areas are still prone to rapid gully headcut retreat as the occurrence of piping at the gully headcuts makes them difficult to manage.

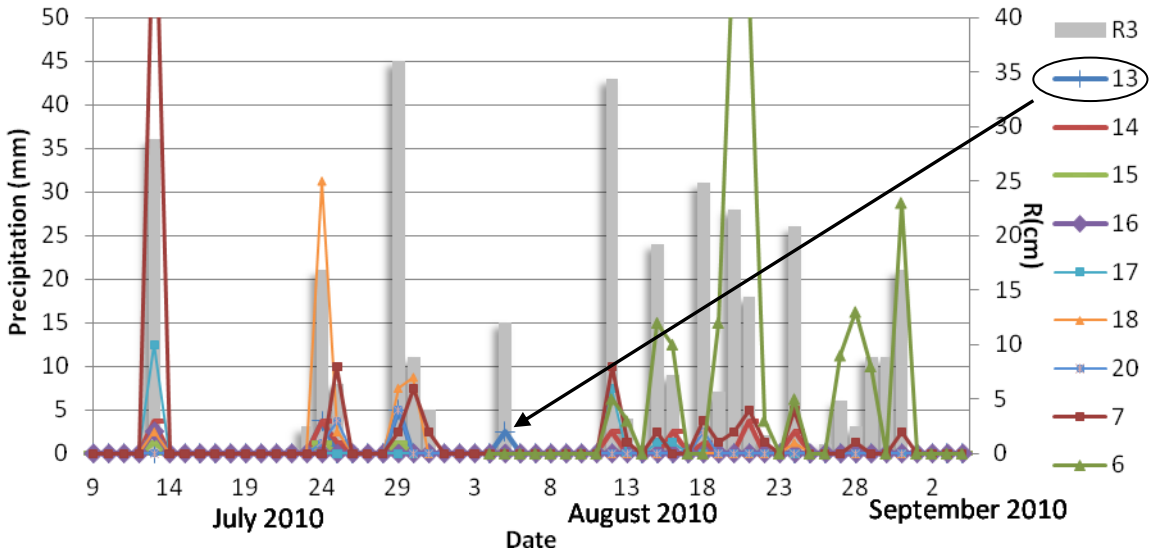

***Fig. 1**. Linear headcut retreat rates related to daily precipitation in the May Bati catchment in summer 2010 Headcut 13 is visited in the excursion. Headcuts 6 and 7 are developed in Vertisols.*

First recorded as a discontinuous gully system on aerial photographs of 1963, the 2010 gully network of May Bati densified (**Fig. 2**), linking hillside gullies to valley bottom gullies and with headcuts situated close to the interfluvia. The present-day activity of 24 gully heads located in the catchment was studied by monitoring their retreat in the rainy season of 2010. The mean linear headcut retreat rate is 0.28 m and varied between 0.02 m and 1.93 m. Highest rates were observed for gullies situated in Vertisols, while low values correspond to gullies situated in exclosures (**Fig. 1**).

***Fig. 2**. Over the past 50 years, gullying in the catchment of May Bati resulted in a dense gully network. Headcut 13 remained stable during the rainy season of 2010.*

Reference

Frankl, A., Poesen, J., De Dapper, M., Deckers, J., Mitiku Haile, Nyssen, J. Assessing gully headcut retreat rates in the semi-arid Highlands of North Ethiopia. In preparation.